and 9 were rejected as being unpatentable over either Rogers in view of Kanterakis, or Rogers in view of Kanterakis and Pickering.

The claims have been amended to more clearly distinguish over the cited references. In particular, claims 1 and 5 have been amended to recite features specific to a time-shift angle demodulator (TSAD), operation of which is illustrated in Figure 3 of the specification. In a TSAD, an unknown signal and a reference signal are processed to form a difference signal, which is then filtered to form an output signal.

As described in the specification, the TSAD of the present invention differs from the prior art in the use of both the lead and lag signals and the original input signals (the unknown signal and the reference signal) to perform phase unwrapping in an efficient manner.

The primary reference, Rogers, does not relate to a TSAD but rather to a PLL (phase lock loop) having a hyperactivity detection circuit. In a PLL, although lead and lag signals may be formed, they are not differenced and filtered as in a TSAD or as presently claimed in the independent claims. Fundamentally, a PLL does not *measure* the frequency or phase of a periodic input signal, although it may create a periodic output signal having that same frequency or phase.

Furthermore, the combination of Rogers and Kanterakis (and, by implication, the combination of Rogers, Kanterakis and Pickering) is not well-founded. The PLL circuit of Rogers performs *acquisition* and ***tracking*** of a reference signal. During acquisition, phase differences between the output signal and the input signal are gradually reduced to near zero, at which time phase lock has been achieved. Following lock and during tracking, the phase of the

output signal is changed to track phase changes in the input signal. One application of a PLL is demodulation, i.e., recovery of information impressed upon a carrier signal to form a communications signal. Such demodulation is incoherent; i.e., it does not require a replica of the carrier signal.

The circuit of Kanterakis (a variant of the Costas loop) has as its purpose to determine the phase shift of a communications signal and to remove that phase shift to recover a replica of the carrier signal and allow for *coherent* demodulation. Lead and lag signals are not differenced and filtered as in a TSAD or as presently claimed in the independent claims, *nor in fact are any such lead and lag signals formed in Kanterakis.*

The very different nature of the circuits of Rogers and Kanterakis may be appreciated from a comparison of the phase detectors of each circuit, the phase detector being a central and important part of either a PLL or Costas loop. The digital PFD (phase/frequency detector) of Rogers, shown in Figure 3 thereof, is composed largely of about a dozen digital logic gates. Its function is to produce either a logic high signal or a logic low signal on output line 27 depending on whether the phase of the input signal leads or lags the phase of the reference signal. The phase detector 35 of Kanterakis, on the other hand, produces an actual phase value by computing the arctangent of the ratio of its two input signals. The phase value so produced in effect allows for recovery of the carrier signal and hence coherent demodulation.

Furthermore, whereas the circuit of Rogers is necessarily largely analog in its implementation, the "circuit" of Kanterakis is actually largely software performing digital signal processing (Kanterakis, Fig. 5).

Given the distinctness of these two circuits, one of ordinary skill in the art would not have modified the PLL of Rogers in accordance with the teachings of Kanterakis regarding Costas loops, in the manner suggested.

Accordingly, independent claims 1 and 5, as well as dependent claims 2, 3 and 6-9 are believed to patentably define over the cited references. Withdrawal of the rejection is respectfully requested.

Respectfully submitted,

TROPIAN, INC.

By: Michael J. Ure

20183 Stevens Creek Boulevard
Suite 150
Cupertino, California 95014
(408) 865-1300
Date: June 6, 2002